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## GEOGRAPHY AND EXPLORATION.

CAMERON'S DISCOVERIES IN AFRICA. — Lieutenant Cameron gave an account of his walk from Lake Tanganyika to the west coast of the continent, at a meeting of the Royal Geographical Society, held April 11th. He said, according to the *Geographical Magazine* for May, that most of the country from the Tanganyika to the west coast is one of almost unspeakable richness. There are metals, iron, copper, silver, and gold; coal also is found; vegetable products, palm-oil, cotton, nutmegs, several sorts of pepper and coffee, all growing wild. The people cultivate several other oil-producing plants, such as ground-nuts and *seni seni*. The Arabs, as far as they have come, have introduced rice, wheat, onions, and a few fruit-trees, all of which seem to flourish well. The countries of Bihé and Bailunda are sufficiently high above the sea to be admirably adapted for European occupation, and would produce whatever may be grown in the south of Europe. The oranges which Señor Gonsalves had planted at Bihé, where he had been settled for over thirty years, were finer than any I had ever seen in Spain or Italy. He also had roses and grapes growing in luxuriance.

The main point of the discoveries I made, I believe to be the connection of the Tanganyika with the Congo system. The Lukuga runs out of the Tanganyika, and there is no place to which it can run but to the Luvwa, which it joins at a short distance below Lake Moero. The levels I have taken prove most conclusively that it can have nothing whatever to do with the Nile; the river at Nyangwé being between 1400 and 1500 feet above the sea, while Gondokoro is over 1600 feet. And also in the dry season the flow of the Lualaba is about 126,000 cubic feet per second; that of the Ganges, which is far larger than the Nile, being not more than 80,000 cubic feet per second in flood-time, and that of the Nile at Gondokoro, below where all the streams unite, is between 40,000 and 50,000 feet per second. Many large rivers flow into the Lualaba below Nyangwé.

There is in the centre of Africa a water-system which might be utilized for commerce, which has no equal upon the face of the globe. Between the large affluents of the Congo and the head-waters of the Zambesi, a canal of between twenty and thirty miles across a level, sandy plain, would join the two systems, and the River Chambezi, which may be accepted as the head stream of the Congo, ought to be navigable to within two hundred miles of the north of Lake Nyassa. To the eastward of Lovate ivory is marvelously plentiful.

The blot upon this fair country is the continuance of the slave trade, which is carried on to a great extent, to supply those countries which have already had their population depleted by the old coast trade. The chiefs, like Kasongo and Meta Yafa, are utterly and entirely irresponsible, and would give a man leave, for the present of two or three guns, to

go and destroy as many villages, and catch as many people as he could for slaves. The Warua, especially, although holders of slaves, would rather die than be slaves themselves. I have heard instances of their being taken even as far as the Island of Zanzibar, and then making their way back, single-handed, to their own country. The only thing that will do away with slavery is opening up Africa to legitimate commerce, and this can be best done by utilizing the magnificent water-systems of the rivers of the interior.

### MICROSCOPY.<sup>1</sup>

WYTHE'S ILLUMINATOR. — Dr. J. H. Wythe recommends for oblique illumination a right-angled prism with a plano-convex lens, cemented to and covering one of its narrow sides, and an ordinary French triplet fastened to the other, close to the farthest angle. Arranged with the plano-convex lens directly downward, the axis of the triplet would be horizontal, and a horizontal cone of achromatic light would be furnished; while by slightly tilting the apparatus an available and extremely oblique illumination is obtained.

SAN FRANCISCO SOCIETY. — At the annual reception of this society, twenty-two members exhibited a large number of objects from the mineral, vegetable, and animal kingdoms. The intelligent classification of the views was a notable improvement upon the management of too many exhibitions of this kind.

BLIVEN'S PHOTOGRAPHS. — Mr. R. H. Bliven, of Elmore, Ohio, is now supplying good photographs of a large variety of objects. He also makes to order photographs of any suitable slide. Such pictures of familiar objects are very interesting. They are doubly important if the slides are particularly choice or rare, as a partial protection in case of accident to the objects themselves; while for educational purposes they are often available under circumstances where a resort to the microscope itself would cause too much interruption or delay.

APERTURE OF AN OBJECTIVE. — [Mr. Tolles contributes the following note in regard to the aperture of an objective marked  $180^\circ$ , which was sent to London some years ago, and has been the object of no little discussion ever since.]

The diameter of the exposed front surface of an immersion objective, is given as  $.043''$ , the point of focus as obtained by using only the rays emerging from the front, comparatively near to the axis,  $= .013''$ , and a diagram is given (Figure 25), as conclusive against any more than  $118^\circ$  of air-angle in the objective. But the objective was marked  $180^\circ$  of air-angle. A year afterwards the author of the diagram, Mr. Wenham, communicates

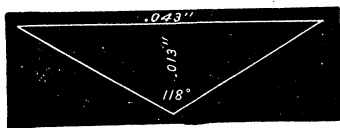


FIG. 25.

another item relating to the angular aperture of the same lens. He gives

<sup>1</sup> This department is conducted by DR. R. H. WARD, Troy, N. Y.